



Forest Health Protection

Pacific Southwest Region



Date: September 18, 2014

File Code: 3400

To: Stephen Prokop, Superintendent, Redwood National Park

Subject: Biological evaluation of two new infestations of *Phytophthora ramorum* along Redwood Creek in Redwood National Park (FHP Report No. N14-04-Revised)

Note- This biological evaluation is an update of the report that was submitted on August 29, 2014 (FHP Report No. N14-04). The discovery on September 9, 2014 of a new Sudden Oak Death infestation in Redwood National Park made it necessary to update the previous report.

Summary

On July 16, 2014, a new infestation of *Phytophthora ramorum*, causal agent of Sudden Oak Death (SOD) was discovered in the area where Bridge Creek empties into Redwood Creek (T.9N, R.2E, NE ¼ of NE ¼ of Sec. 7). More recently, another new infestation was discovered on September 9, 2014 along both sides of Redwood Creek between Bond and 44 Creeks (T.10N, R.1E, Sec. 25 and SW ¼ of Sec 24). This biological evaluation report documents the two new infestations and describes actions that are being developed to manage the disease. While lab confirmation of the pathogen from samples from the Bond/44 Creek site, the two areas are now the northernmost occurrences of SOD in California. The Bridge Creek infestation contains approximately 35 acres of scattered SOD-killed and symptomatic tanoak and lesser amounts of symptomatic California bay laurel. It is located in northern Humboldt County, approximately 11 air miles north of the Redwood Valley infestation and 20 air miles south of the Del Norte County line. While surveys are just getting started, the Bond/44 Creek infestation is currently estimated to cover an area of about 64 acres, and is approximately 12 to 13 air miles north of the Redwood Valley infestation and 19 air miles south of the Del Norte County line. These finds represent a significant jump north of *P. ramorum*, and are in the middle of an approximately 1,000-square mile section of vulnerable forest land.

Followup surveys and sampling efforts conducted at the Bridge Creek site since July 16 provided additional details regarding the composition and distribution of vegetation in the area, the size of the infestation and the distribution of mortality. A visit to the site on August 13, 2014 by National Park Service (NPS), University of California Cooperative Extension (UCCE), Bureau of Land Management and US Forest Service Forest Health Protection (FHP) personnel provided input toward the development of potential management actions. Following advice and recommendations from UCCE and FHP, Redwood National Park management and leadership developed a set of management

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actions to commence this fall, including cutting of tanoak and bay laurel in the infestation area and a 100-meter buffer zone, herbicide treatment of stumps to prevent sprouting, and followup monitoring and treatments.

Followup surveys and sampling efforts at the Bond/44 Creek site were initiated immediately following the discovery of tanoak mortality on September 9. As soon as the presence of the pathogen is confirmed by the UCCE lab in Eureka, management measures similar to those at the Bridge Creek site will be initiated. Failure to act swiftly at both areas will lead to extensive tanoak mortality in this 640,000-acre swath of northern California forest. If control is to be both effective and inexpensive, it will be important to begin treatments before the start of the next rainy season. FHP fully approves of this effort and endorses its financial support.

Background- Pathogen Distribution, Detection and Spread in California

SOD is a problem caused by the pathogen *Phytophthora ramorum* in some coastal California forests containing tanoak or live oak. Once established in a wildland environment, the pathogen expands its range by wind-driven rain, spreading its inoculum (largely sporangia) to nearby susceptible trees. Only trees within a few meters of already infected trees are likely to receive enough spores to become infected. Spread occurs mainly during warm spring rains. While localized spread is most common, sporangia have been shown to be blown up to 3 miles during large storm events.

P. ramorum is typically introduced into wildland environments through the out-planting of infected nursery stock. The pathogen was first introduced to California forests sometime between 1980 and 1990, in three separate locations near San Francisco Bay (at Big Sur, Santa Cruz County and Mt. Tamalpais). By the time *P. ramorum* was identified as the causal pathogen of Sudden Oak Death in 2000, it had already spread to several hundreds of acres in each of these locations. Although many native California plants were later discovered to host the pathogen with varying degrees of damage, outright mortality is most common in tanoak and several red oak species. The discovery that infested California bay laurel leaves produce significant levels of inoculum, which readily infect other nearby plants, was crucial to our understanding of disease spread.

In 2001, a new infection center was found in the mountains just to the east of Brookings, Oregon. Vigorous management activities were focused on containing the disease in the mountains near Brookings, and these have been largely (but not completely) successful in slowing the spread of the disease.

In 2002, the first new infection center in Humboldt County was found in the Redway area, 50 miles south of Eureka, 75 miles north of the northernmost infection center in Sonoma County. The affected area in Redway expanded very quickly, defying early attempts to contain it.

In 2010, the pathogen was found to have made a significant leap north with the discovery of a new infestation in Redwood Valley, approximately 7 miles north of US Highway 299. Between the infested area near Redway and the outbreak area in southwestern

Oregon was a stretch of 118 miles (as the crow flies) of high-risk California coast range which, until the 2010 detection in Redwood Valley, was considered to be uninfested in spite of it having approximately 1,000 square miles of uninterrupted forest filled with susceptible tree species. However, in the four years since the Redwood Valley infestation was discovered, additional infection sites have been discovered in Humboldt county between the Redway and Redwood Valley areas at the Mad River, near Blocksville, and in Trinity County northeast of Alderpoint.

Because this area of northern California is an extremely significant high risk zone for the introduction and spread of SOD, it has been carefully monitored since 2004. The main monitoring techniques have been the Forest Health Monitoring annual aerial flyover of this area, the use of stream baiting, coordinated by the UC Davis Rizzo Laboratory and the UC Cooperative Extension Office in Eureka and strategic ground-based surveys by the UC Cooperative Extension team. The aerial flyover involves sketch-mapping the locations of all recently dead tanoak trees that can be seen from the air, followed by the ground checking of all trees marked killed by unknown causes (which would include trees that might have been killed by *P. ramorum*). Stream-bait monitoring involves the sampling of 35 to 55 north coast streams from February to June of each year. Sites chosen for stream baiting were selected because they covered the range of streams found in the high-risk zone and because they were downstream from areas with human influence. The locations of the 2012 stream-bait monitoring stations in the Redwood Creek watershed of Redwood National Park are shown in Figure 1. The ground-based monitoring involves the evaluation of any reported tree of concern, pre-timber harvest surveys on private land and an annual survey of high-use recreation areas, including Forest Service, State Park, National Park, County Park and boat launch locations. Several stream bait stations have been located in Redwood National Park. Bridge Creek was last stream baited in 2012, but unfortunately the stream bait location was just upstream of where the Bridge Creek infestation now appears. While many stretches of Redwood Creek were surveyed in recent years, an extended survey (like the one done to find this infestation) had not been completed since 2010. Aerial surveys have been completed annually, yet the Bridge Creek and Bond/44 Creek infestations went unnoticed, likely because of the many old growth Redwood trees which conceal much of the understory.

Discovery and Confirmation of the Bridge Creek SOD Infestation Area

As was stated above, the new infestation of *P. ramorum* was discovered by one NPS and three UCCE employees during a SOD survey of Redwood Creek on July 16th, 2014. The legal designation for this area is T.9N, R.2E, NE ¼ of NE ¼ of Sec. 7 (Figure 2). While walking down Redwood Creek, the crew came around a bend just before the mouth of Bridge Creek and noticed several large standing-dead tanoaks. On further inspection, they found tanoak mortality on both sides of both Bridge Creek and Redwood Creek. A view of the SOD infestation from the confluence of Bridge and Redwood Creeks is shown in Figure 3. Twig cankers were observed, collected, and plated on selective agar media to reveal the pathogen responsible – *P. ramorum*. These results were confirmed by the UC Davis Rizzo lab. Located in northern Humboldt County, the new infestation area is approximately 11 air miles north of the Redwood Valley infestation and 20 air miles

south of the Del Norte County line. Obviously, this discovery represents a significant jump north in the range of *P. ramorum* in California.

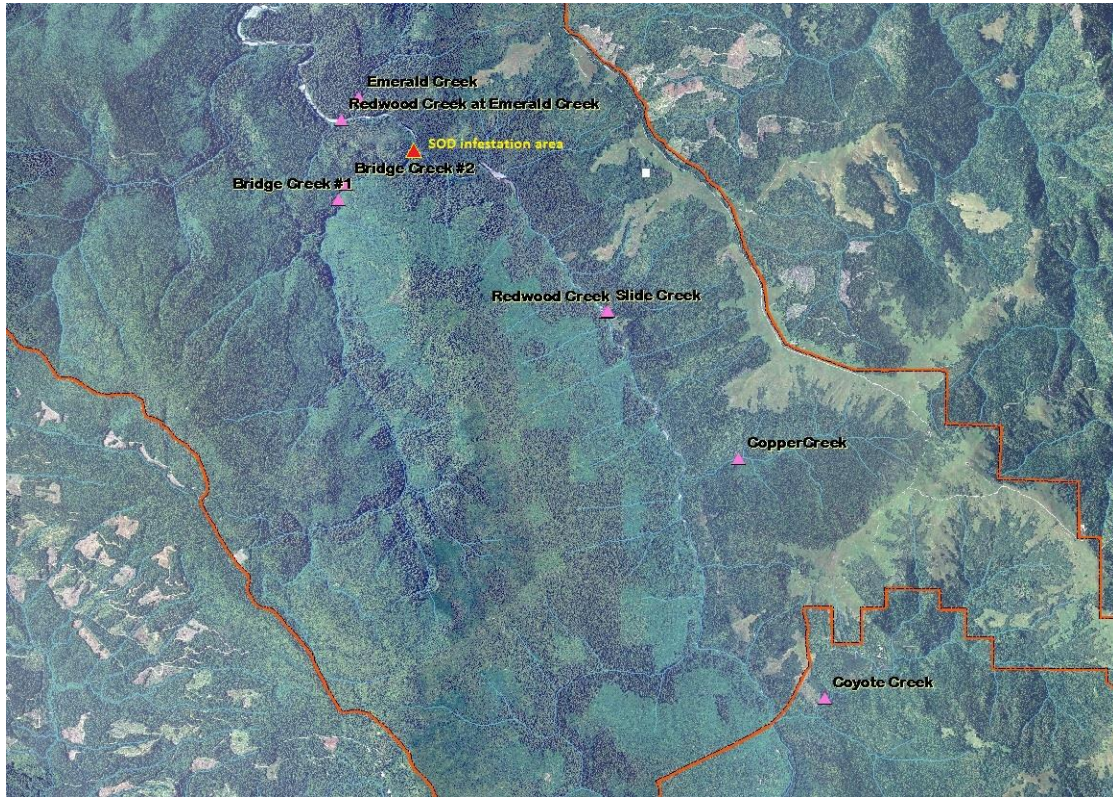


Figure 1. Locations of the 2012 stream bait monitoring stations (pink triangles) in the Redwood Creek watershed of Redwood National Park. The red triangle indicates the location of the Bridge Creek SOD infestation and the orange line indicates the boundary of the National Park. The new Bond/44 Creek infestation area is approximately 3 miles downstream (northwest) of the Bridge Creek infestation.

Discovery of the Bond/44 Creek SOD Infestation Area

The new infestation of *P. ramorum* was noted during an SOD reconnaissance flight conducted by the USFS Forest Health Protection aerial detection program with the UCCE Forest Advisor and NPS biological technician on-board on September 9, 2014. Dead tanoaks were observed along Redwood Creek near Bond Creek. The following day, two NPS biological technicians traveled to the site and observed dead and dying tanoak and symptomatic bay along Redwood Creek between Bond and 44 Creeks. The legal designation for this area is T.10N, R.1E, Sec. 25 and SW ¼ of Sec 24 (Figure 2). Affected trees were found on both sides of Redwood Creek. A view of the SOD infestation along the bank of Redwood Creek is shown in Figure 4. Twig cankers from tanoak and symptomatic foliage from both tanoak and bay were observed, collected, and sent to the UCCE office in Eureka for isolation in the lab on selective agar medium to

identify the pathogen responsible for the mortality. Because the observed symptoms and pattern of mortality matches that of SOD, it would be very surprising if the isolations fail reveal *P. ramorum*. This newest infestation area is approximately 12 to 13 air miles north of the Redwood Valley infestation and 19 air miles south of the Del Norte County line. It is approximately 3 miles downstream of the (northwest) of the Bridge Creek infestation.

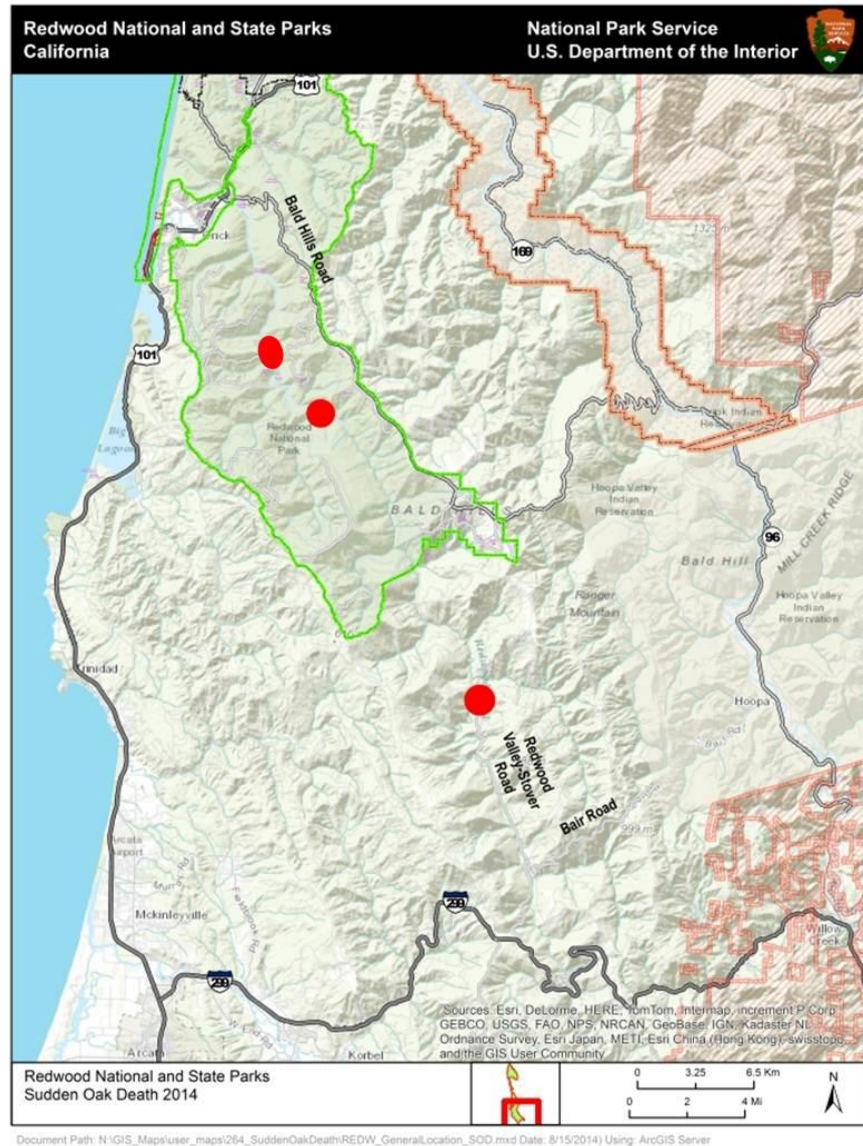


Figure 2. Locations of the Bridge Creek, Bond/44 Creek and Redwood Valley SOD infestation areas. The green line indicates the boundary of Redwood National Park. The northernmost red dot marks the location (not to scale) of the Bond/44 Creek SOD infestation, the middle red dot marks the location (not to scale) of the Bridge Creek SOD infestation and the southernmost red dot indicates the location of the Redwood Valley SOD infestation.



Figure 3. View of dead and dying *P. ramorum*-infected tanoak looking up Bridge Creek from where it empties into Redwood Creek.

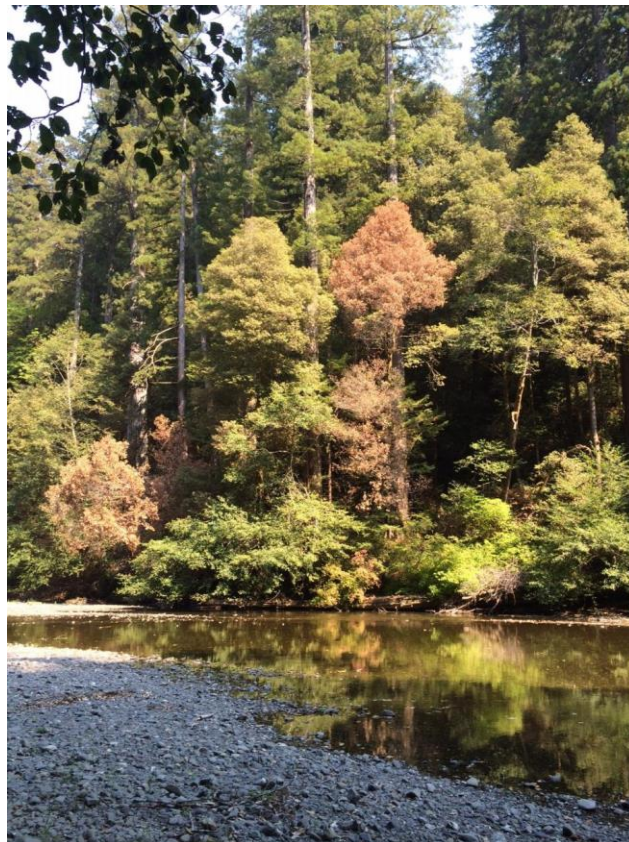


Figure 4. View of dead and dying tanoak along the bank of Redwood Creek between Bond and 44 Creeks.

Followup Surveys and Description of the Bridge Creek SOD Infestation Area

Followup visits and SOD sampling efforts at the new Bridge Creek infestation area conducted since July 16 have provided additional details regarding the composition and distribution of vegetation in the area, the size of the infestation and the distribution of mortality. The most common hardwood tree species in the area are tanoak, alder and bigleaf maple. Large coast redwood and Douglas-fir are scattered throughout the overstory. California bay laurel is fairly uncommon, though it is most notably present near the confluence of Bridge and Redwood Creeks.

Tanoak mortality is evident on both sides of both creeks, but the majority of the mortality is located on the west side of Redwood Creek. While the majority of the mortality is concentrated in a small area near the junction of Bridge and Redwood Creeks, symptomatic tanoak and bay have been observed within an area of about 34 acres. Affected species appear to be mostly tanoak and bay, although bays have yet to yield positive results in the lab. This is likely due to the warm summer temperatures which negatively affect sporulation. All other tree species in the area appear to be healthy.

As of August 7, 2014, symptomatic foliage from 7 California bay laurel and 32 tanoak trees were collected and either sent to the UC Davis Rizzo lab for isolation on selective agar media or processed in a similar fashion at the Redwood National Park lab at the South Operations Center in Orick. The results are summarized in Table 1 and the locations where the samples were collected are shown in Figure 5.

Table 1. Summary of isolation results from California bay laurel and tanoak samples collected at the Bridge Creek SOD infestation area, Redwood National Park.

California Bay Laurel (all samples sent to UC Davis)

Total number of samples	7
Positive for <i>P. ramorum</i>	1
Negative for <i>P. ramorum</i>	6

Tanoak (32 samples sent to UC Davis, 7 plated at Redwood National Park)

Total number of samples	32
Positive for <i>P. ramorum</i>	12
Negative for <i>P. ramorum</i>	20

UTMs Of Positive Bay Laurel And Tanoak Samples

UMCA = *Umbellularia californica* (California Bay Laurel); LIDE = *Lithocarpus densiflorus* (Tanoak)

<u>Identification Number</u>	<u>UTM</u>
UMCA8	4177728 4560575
LIDE6	417785 4560606
LIDE7	417571 4560749
LIDE9	417591 4560722
LIDE10	417547 4560691
LIDE11	417561 4560744
LIDE19	417737 4560533
LIDE 26	417769 4560510
LIDE 28	417773 4560565
LIDE 29	417756 4560630
LIDE 30	417743 4560591
LIDE 32	417728 4560575
LIDE 33	417430 4560502



Figure 5. Location of samples collected from symptomatic foliage of tanoak and bay in the Bridge Creek SOD infestation area in Redwood National Park. The yellow polygon denotes the area of infestation. Red dots are tanoak samples that were positive for *P*.

ramorum, the black dot is the California bay laurel that was positive for *P. ramorum*, and the small yellow dots are tanoak and bay samples that were negative for *P. ramorum*. Although some *P. ramorum*-positives appear to be outside of the boundary on the east side of Redwood Creek, this is purely a GIS layer/projection issue. All positive samples were inside the shaded boundary.

Followup Surveys and Description of the Bond/44 Creek SOD Infestation Area

Follow-up visits and SOD sampling efforts at the new Bond/44 Creek infestation area are currently being conducted. Details regarding the composition and distribution of vegetation in the area, the size of the infestation and the distribution of mortality, will be fully assessed and delineated. At the present time, our knowledge of the area indicates that the most common hardwood tree species in the area are tanoak, alder and bigleaf maple. Large coast redwood and Douglas-fir are scattered throughout the overstory. California bay laurel is fairly uncommon, though it is most notably present in the riparian corridors along Redwood Creek and its tributaries.

Tanoak mortality is evident on both sides of Redwood Creek, but was not observed upstream along Bond or 44 Creeks. Affected species appear to be tanoak and bay. All other tree species in the area appear to be healthy. Dead and dying tanoak and symptomatic bay are scattered between Bond and 44 Creeks and between the edge of the active Redwood Creek channel up to 60 meters away from the channel. Based on this distance, a polygon was drawn around the forest between Bond and 44 Creeks and up to 60 meters from Redwood Creek that measures 64 acres in size (Figure 6). Unless additional surveys reveal additional infected trees further than 60 meters from the active channel, this will be considered to be the area of infestation. As of September 11, 2014, symptomatic foliage from both bay and tanoak trees were collected and delivered to the UCCE office in Eureka, California for isolation on selective agar media to test for the presence of *P. ramorum*.

Discussion

On the basis of on-the-ground observations of dead and symptomatic tanoak and symptomatic bay laurel following the initial discovery of the Bridge Creek and Bond/44 Creek infestations, Redwood National Park and UCCE managers have delineated 34 and 64-acre areas of SOD infestation, respectively. Ongoing testing of tanoak and bay laurel foliar samples continues to refine and update these delineations.

On August 11-12, a US Forest Service SOD program review was conducted at the UCCE office in Eureka and at several of the SOD project sites at Redwood Valley. The meeting was attended by a variety of NPS, UCCE, Bureau of Land Management, Six Rivers National Forest and US Forest Service Forest Health Protection personnel, including Regional Pathologist Phil Cannon, Northern California Shared Service Area Pathologist Pete Angwin and Assistant Director of State and Private Forestry Chris Fischer. The meeting provided many opportunities to discuss potential courses of action to address the Bridge Creek infestation. On August 13, a slightly smaller group including Phil Cannon

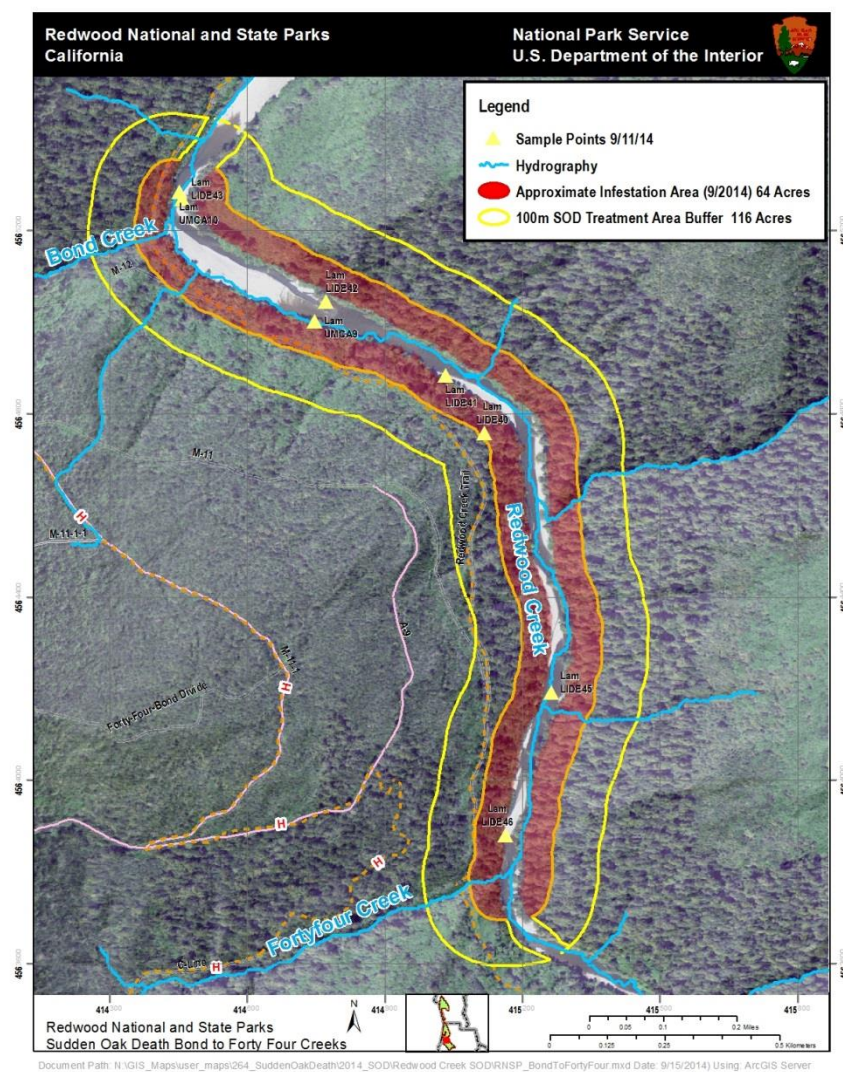


Figure 6. Location of samples collected from tanoak twig cankers and symptomatic foliage of tanoak and bay in the Bond/44 Creek SOD infestation area in Redwood National Park (yellow triangles). The red polygon identifies the 64-acre area of infestation. The yellow line surrounds the additional 100-meter, 116-acre SOD treatment buffer area (180 acres total).

and Chris Fischer visited the Bridge Creek infestation site, where additional discussion and on-site observations and evaluations were made. While on the site, Phil Cannon saw first-hand where the dead and symptomatic tanoak and symptomatic bay laurel are located, and commented on how little bay laurel are present in the area. He also noted that most of the terrain around Redwood and Bridge Creek is very steep, starting at an approximately 45° slope near the creeks and rapidly increasing to about 60° as you get

approximately 100 meters away from the watercourses. This will make the implementation of management actions very difficult. Even so, several options were discussed and offered to the Redwood National Park personnel to consider.

The next day, on August 14, Redwood National Park managers and leadership met to discuss the problem and determine a course of action. They decided to take action immediately. They propose to:

- *Develop a contract to hire a crew to fell all tanoak and bay within the 34-acre area of infestation and in a 100-meter buffer zone around the area. This will result in a treatment area of approximately 90 acres. Felling costs are estimated to cost somewhere between \$30,000-50,000, depending on the contractor.*
- *Treat stumps of tanoak and bay with herbicides (most likely imazapyr and glyphosate) immediately after cutting to reduce sprouting. Any stumps that sprout after treatment will be retreated until the job is complete.*
- *If the sampling that is currently being done shows any *P. ramorum*-infected tanoak or bay outside of the 34-acre area of infestation, a modified buffer zone will be drawn to encompass all tanoak and bay 100 meters from the find.*
- *If the Park is unable to implement a contract before the winter rains set in, then herbicides will be applied this fall to tanoak and bay trees that are mid-canopy and taller in height. The objective would be to reduce the potential for aerial spread of *P. ramorum* before next spring by killing the tallest bays and tanoaks. A contract would then be awarded to fell all tanoak and bay in the treatment area by the end of 2015.*
- *Intensify the SOD early detection monitoring efforts around the current treatment zone. Tanoak and bay samples will be collected at least 300 meters beyond the buffer treatment perimeter, and further out if any symptomatic trees are observed. The objective will be to get the best idea possible where the edge of the infestation is so that the buffer zone can be placed at least 100-meters out from the first pathogen-free trees. In addition, any *P. ramorum*-positives will be subject to immediate treatment, including the installation of a new 100-meter buffer zone.*

The September 9 discovery of tanoak mortality at the Bond/44 Creek area adds one more infestation area where immediate management action is warranted. On September 15, NPS management was apprised of the new infestation. In response, they reiterated their support for immediate action to treat the site as quickly as possible. The management response that was proposed parallels the one that was established for the Bridge Creek site as follows:

- *Complete all necessary surveys, sampling and delineations of SOD between Bond and 44 Creeks. The result of this effort will be used to finalize an infestation zone area, currently estimated at 64 acres, and the 100 meter buffer zone, currently estimated at 116 acres (total area of 180-acres).*

- *Develop a contract to hire a crew to fell all tanoak and bay within the full treatment area. Felling costs are estimated to be approximately \$100,000 based on the current cost for implementation at the Bridge Creek site.*
- *Treat stumps of tanoak and bay with herbicides (most likely imazapyr and glyphosate) immediately after cutting to reduce sprouting. Any stumps that sprout after treatment will be retreated until the job is complete. Herbicide treatments will not be used within 20 feet of the Redwood Creek trail wherever the trail traverses the treatment zone. Mechanical cutting of sprouts will be used.*
- *If the sampling that is currently being done shows any *P. ramorum*-infected tanoak or bay outside of the 64-acre area of infestation, a modified buffer zone will be drawn to encompass all tanoak and bay 100 meters from the find.*
- *If the Park is unable to implement a contract before the winter rains set in, then herbicides will be applied this fall to tanoak and bay trees that are mid-canopy and taller in height. The objective would be to reduce the potential for aerial spread of *P. ramorum* before next spring by killing the tallest bays and tanoaks. A contract would then be awarded to fell all tanoak and bay in the treatment area by the end of 2015.*
- *Intensify the SOD early detection monitoring efforts around the current treatment zone. Tanoak and bay samples will be collected at least 300 meters beyond the buffer treatment perimeter, and further out if any symptomatic trees are observed. The objective will be to get the best idea possible where the edge of the infestation is so that the buffer zone can be placed at least 100-meters out from the first pathogen-free trees. In addition, any *P. ramorum*-positives will be subject to immediate treatment, including the installation of a new 100-meter buffer zone.*

The impacts of failing to address the *P. ramorum* infestations at Bridge Creek and Bond/44 Creek are many. SOD hosts (especially tanoak) are extremely ubiquitous in all surrounding forests. Tanoak is the most abundant hardwood species in Redwood National Park and many (if not all) creeks and drainages are densely populated by California bay laurel. Although areas of dense alders provide some host-breaks along Redwood and Bridge Creeks, along with open areas of old growth redwood and mixed conifer forests, none of these areas are completely void of hosts. Without management action, it is highly likely that this infestation will spread in all directions.

This infestation has the potential to have serious consequences on tanoak resources in the park. Tanoak provides food for a variety of wildlife including birds and mammals, as well as habitat for a variety of wildlife and arthropods. Loss of this keystone species would likewise have indirect impact on other species up and down all biological trophic levels. Tanoak is a cultural resource, considered sacred by native peoples. As a provider of food and other materials, it is an important resource that has no analog in the assemblage of species that currently exist in the redwood forests of Redwood National

Park. Tanoak extirpation, whether localized or otherwise, would represent a significant cultural impact.

The degree of impact on native park vegetation is mixed. Certainly the loss of tanoak as a native species represents a change in the vegetation composition and structure of the forest. There are several forest association types throughout the park's coniferous forest that will be impacted by loss of tanoak. However, tanoaks do not occupy a dominant position in the old growth forests of the park, which is the preferred natural vegetation condition that the park is striving to regain through restoration. There are easily many more tanoak trees in Redwood National Park than in any time prior to the commencement of the logging era. For the most part, localized extirpation by SOD would lead to replacement by other trees species, conifer or hardwood, depending on the setting, without significant impact on the compositional structure of the primary forest alliances found in the park, i.e spruce, redwood, Douglas-fir, pine.

If the disease is allowed to spread, visitors could be impacted by increased implementation of Best Management Practices employed to address the problem. Closure of infested trails, camping areas, or roads would have direct impacts on the ability of visitors to enjoy the park. However, significant impacts on tourism economies are not anticipated unless the disease were to spread into high visitor use areas such as paid campgrounds or highly visited trails such as the Tall Trees (which is located about midway between the two infestation areas) or Lady Bird Johnson Groves.

There are no anticipated non-tourism-related socio-economic consequences to the local economy as long as the disease remains only in the park. This is because forest products and nursery trades do not have economic ties to the management of resources within the park. However, while local businesses will not feel any impact of the disease as it currently exists, this would change if the disease became established on trails used by horse concessionaires, or in campgrounds such as at Prairie Creek, or popular visitor use sites such as the Tall Trees or Lady Bird Johnson Groves. In addition, if the disease were to spread outside the park, non-tourism-related businesses could be affected. This is particularly true if the disease were to spread to the currently uninfested, quarantine-free Del Norte County.

Recommendations and Conclusions

The treatments proposed above were developed with major input from USFS Forest Health Protection and UC Cooperative Extension personnel. At this point, they represent the best course of action. We commend the Park's efforts and intent to immediately address the problem. SOD is a very difficult disease to manage. While it is quite possible that the treatment will neither eradicate or contain the disease, at the very least it will slow it down significantly by reducing the inoculum produced by the pathogen in currently infected trees and the number of nearby trees that are available to become infected. **Passage of time is the worst enemy here- the longer the infestation goes untreated, the less effective future treatments will be, and more expensive they will become.**

It must be recognized from the outset that the treatments that are being proposed will be difficult to implement, particularly because of the distance of the infestation to the nearest road and, in the case of the Bridge Creek infestation, because of the difficult steep terrain in which the work will be accomplished. Safety considerations associated with felling trees and treating stumps in the steep terrain will likely mean that not all trees and stumps will be treated, and the 100-meter buffer treatment zone may not be adhered to at all times. While there was considerable discussion regarding the advantages of installing a larger buffer zone (of 200 or 300 meters) which would definitely provide a more effective disease control, the 100-meter-buffer is probably the largest that is operationally feasible for the Park to implement. However, this makes continued monitoring and treatment of newly-infested areas even more critical to the success of the overall effort. We have no doubt that the managers at the Park will do the best that is humanly possible.

As always, the ability to secure funding necessary to implement the proposed management actions in a timely fashion will be a major factor that will determine its success. Because the Park has little or no funds available to support this effort, funding from outside sources are critical. To assist in this, Leonel Arguello plans to apply for US Forest Service Forest Health Protection funds through the Cooperative Forest Insect and Disease Suppression Program between the USFS and the Department of the Interior. **This biological evaluation reinforces our wholehearted support for this project.** In addition, if the Park managers find that they need additional funds to address the problem, they are encouraged to apply for funds through the USFS Forest Health Protection Sudden Oak Death Management proposal process. Phil Cannon leads this program and can answer any questions you might have.

If you have any questions regarding this biological evaluation report or need additional assistance, please feel free to contact Pete Angwin at 530-226-2436 or Phil Cannon at 707-562-8913.

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